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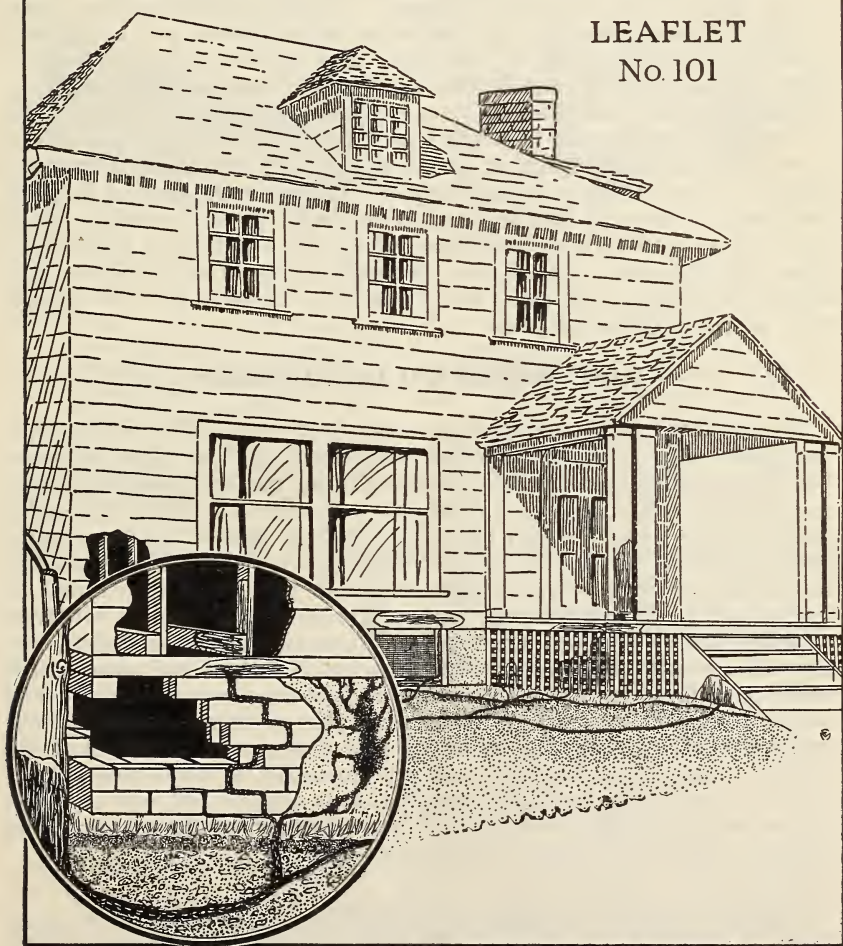
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# INJURY TO BUILDINGS BY TERMITES

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# INJURY TO BUILDINGS BY TERMITES<sup>1</sup>

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## What Are Termites?

Termites represent an important group of social insects, other groups being ants, bees, and wasps. While resembling true ants, termites belong to an entirely distinct order of insects, and are closely related to the Blattidae, or roaches. Termites occur in numerous forms throughout the world but in greatest abundance in subtropical and tropical countries. For our immediate purpose, however, we are concerned only with termites which may occasion serious damage to woodwork of buildings or to stored articles, including furniture, books, or other articles of plant origin. The common type of destructive house termite of North America includes ground-nesting forms that cannot live without moisture, which they get from the earth.<sup>2</sup> These termites occur practically throughout the United States, but serious damage to buildings and contents is more apt to be experienced in the Southern States.

## How Termites Get Into Buildings

The normal habitat of these termites is in connection with dead-wood, old stumps, etc., on which they feed, and in such locations they may establish large colonies containing queens, wingless workers, and soldiers. In the spring, and sometimes in the fall, males and females—white-winged but with black or brown bodies—swarm from the outdoor colonies, or in buildings to which their work has extended, to seek favorable points outdoors for the establishment of new colonies. These colored, winged forms should not be confused with the narrow-waisted, true ants. These swarming, or flying, termites do not attack wood or other articles in houses and must reach the open if they are to be successful in founding new colonies. The descendants of these winged migrants, the workers—cream-colored “white ants”—are the wood-mining and destructive members of the colony. These shun the light and are concealed in their runways or behind a protecting shell of wood which is always left and are seen only when the wood in which they are working, or their connecting runways over masonry, etc., are broken open.

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<sup>1</sup> This leaflet is a complete revision of, and supersedes, Leaflet No. 31.

<sup>2</sup> *The dry-wood termite.*—There is a type of dry-wood termite, which does not live in the ground but may attack wood directly at any point in a building, gaining access through windows or doors. In the United States this type is restricted in distribution to the Atlantic coast from Norfolk, Va., south, and up the Pacific coast to northern California.



The invasion of buildings by termites practically always has its source from outdoor communities through foraging tunnels made by the workers in any direction under the surface of the ground. Thence chance contacts made with buildings of wood or with the structural wood of masonry buildings supplies a rich "granary" of food. Entry through basement timbers is immediate, although the invasion may not be recognized by the owners for several years.

In case of the better type of wooden buildings constructed on stone or concrete foundations, the worker termites can bridge over such foundations by means of earthlike shelter tubes built of earth and wood particles (fig. 1, B). The workers are also able to build buttressed tubes reaching, without support, up from the ground, rarely more than a foot, in the effort to contact with structural timbers.

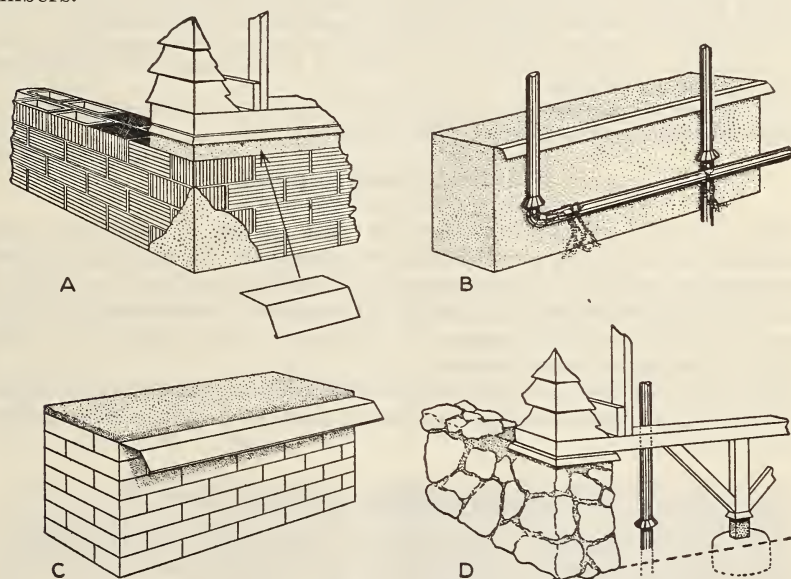


FIGURE 1.—Illustrating use of metal shields in foundation walls and about piping and wooden supports

In the usual type of masonry buildings with concrete foundations and full basement covering of concrete, a common means of entry is through cracks which are very likely to develop in the often inferior concrete used as base for joists for basement flooring. Such joists are moistened by the concrete with some resulting decay and then, when made accessible through cracks, furnish an ideal start for the termites.

### Types of Construction versus Termites

It would seem obvious that the first consideration of the prospective home owner and builder should be the adoption of a type of construction which would prevent the entry of termites. That this can be done has been well demonstrated and involves only slight

additional cost, which may be many times returned in the avoidance of repairs necessitated by the entrance of termites.

To indicate the likelihood of termite invasion under different types of construction, the following list is presented beginning with the most susceptible:

(1) Wooden houses built directly on the ground or supported on wooden posts.

(2) Houses built of, or supported by, hollow masonry units uncapped and without concrete footings.

(3) Wooden houses built on masonry pillars or with continuous masonry underpinning but without full protection over unexcavated earth.

(4) Building, frame or stone, with concrete base throughout but with joist and basement floors laid directly in wet concrete, or with connecting terraces, sun parlors, porches, steps, etc., filled in with earth and wood debris.

(5) Buildings in which the foundation or basement construction is of close-grained heartwood termite-resistant woods, such as California redwood, southern cypress, and longleaf pine, and further protected by metal shields.

(6) Houses in which all wood used in foundation or basement construction has been impregnated with an approved preservative and further protected with metal shields.

(7) Houses the foundation or basement of which are entirely of concrete, including baseboards, with cove or "sanitary arc."

### Building Termite-proof

On the basis of the classification just given, it is obvious that where such course is possible, all wood should be eliminated from foundation, cellars, and basements, including porches, sun parlors, etc., with the substitution therefor of masonry or concrete, and this should apply both to houses of masonry construction and those having a wood superstructure.

This type of construction insures the fullest protection from termite entry, and has been given first importance by the Department for 25 to 30 years.

### Building for Reasonable Security

Where, for economy or less need for durability, it is desirable to use wood as supporting posts or as joists or beams, etc., in the foundations and basements of buildings, the risk from termites can be prevented—if not fully, at least for many years—by strict observance of the following recommendations:

(1) All structural wood to be so employed in or within 18 inches of the earth should be treated as indicated in the following paragraph with a preservative which will repel termites. Such treatment need not be given to wood columns and posts resting on a concrete floor, but additional security can be provided by placing them on noncorroding metal plates or on concrete footings rising somewhat above the floor level. Wooden door casings in such basement rooms will be given added security if the lower 5 or 6 inches of the casings are in the form of a properly shaped concrete block rising from and continuous with the floor. The door itself needs no protection. It is not necessary also to use treated wood for steps built over a concrete base if the concrete is given a projection of at least 6 inches beyond the steps. The additional security of footings of the nature indicated is especially called for in the more southern portions of the United States.

(2) All timber to be used in contact with or near the earth should be thoroughly impregnated by a standard pressure process with coal-tar creosote or equivalent preservative. Whenever possible timber should be cut to proper dimensions before treatment, but when cutting after treatment is unavoidable

the cut surface should be thoroughly coated with the preservative. Concerns equipped to give such treatment are available in different parts of the United States, and the securing of treated material should be required in the building specifications.

(3) Masonry foundations and footings preferably should be laid in portland-cement mortar and with all joinings well filled and pointed. Foundations built of artificial masonry units whether hollow or solid should be capped below the woodwork with at least 1 inch of portland-cement mortar, or with mortar and slate, or solid or joined noncorroding metal.

(4) As protection against entry into houses through shelter tubes—and this applies particularly to southern areas—metal shields should be provided around the top of the masonry foundation (fig. 1, A-D), and around all pillars, supports (fig. 1, D), and piping (fig. 1, B, D), below the woodwork of frame buildings. Such protection should be given also to all inside surfaces which can be reached by termites from unprotected soil. The shields may be formed of a strip of noncorroding metal,<sup>3</sup> firmly inserted in the surface of the masonry, or between the foundation and the wood, with the projecting edge bent downward at an angle of 45° and extending horizontally at least 2 inches from the face of the foundation. In masonry buildings this shield should be inset in the masonry at a height at least 18 inches above the ground (fig. 1, C).

(5) Where only a portion of the space under the house is to be excavated for cellar or basement rooms, the balance, including sun parlors, porches, etc., should be excavated so that there will be no earth within 18 inches of the wood, and this area should also be provided with cross ventilation.

### How to Locate Damage

Early indication of the presence of termites may come from the emergence in the buildings in spring and fall of the winged migrating males and females (fig. 2, A). Incidentally, sweeping up and killing these swarming insects, while a good thing in itself, does not in any way stop the damage, inasmuch as the full strength of the invaders will be maintained from the parent colony until adequate and usually radical measures have been taken to isolate the building and stop further invasion.

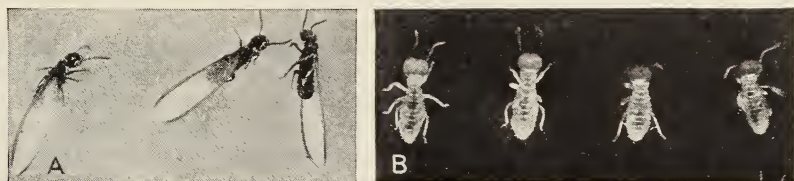


FIGURE 2.—Subterranean termites: A, winged adults; B, mature workers. About 3 times natural size

Another warning that termites are around is the branching shelter tubes on foundation walls reaching from the ground to the woodwork, over the surface of stone, brick, or other foundation material through which they cannot burrow (fig. 1, B).

Having ascertained the fact of termite presence, the location of the termites and the extent of their work cannot necessarily be determined by the point of emergence of the winged forms, but usually will be indicated by yielding of basement flooring or softening or yielding of wainscoting, studding, etc., or by evidence of their destructive work in books, etc.

<sup>3</sup> Such as copper, or zinc, or an alloy composed of 28 percent of copper, 67 percent of nickel, and 5 percent of iron, manganese, and silicon.



## How to Stop Termite Damage

The means of stopping termite injury in a building are substantially the same as those to be employed in new construction to prevent the entry of termites. Inasmuch as contact with soil moisture is absolutely essential to the life of ground-inhabiting termites, reconstruction of a type which permanently breaks and makes impassable the ground connections maintained between the parent soil colony and any building will result in the prompt dying of any termites remaining in the woodwork or furniture or contents of the building even if they have reached the second or third floors. However, if through water leakage or other source such woodwork is kept more or less permanently moist, termites cut off in the building may continue to work as long as this condition lasts, and this applies particularly to damp corners of basements or similar conditions which may result from leakages of water pipes in bathrooms, kitchens, etc.

### The Two Best Remedies

The most lasting and effective remedy, as already indicated, is in the replacement of wood in or near the basement of the building with concrete. Second, in order of effectiveness and durability, is in replacement of such wood with treated wood or timbers, and, in regions of excessive termite damage, to employ under both methods protective shields. By this means contact between colony and building is permanently broken and relief from termite damage is assured. This means that joists imbedded in concrete and the basement floor and baseboards should be replaced with any type of plain or ornamental concrete. In basement rooms so constructed, movable furniture of wood, and also built-in furniture, particularly if resting on concrete footings, can be employed with safety.

### Capping and Facing

To give the capping and facing to basement walls of frame buildings indicated in paragraph 3, page 5, it is rarely necessary to jack up the building, but usually it is possible to remove the upper tier of brick or upper portion of the masonry unit in sections and replace with portland-cement mortar and suitable capping of slate or mortar.

Where poor grades of mortar have been used in masonry walls below the ground, it may be necessary to coat the outside, and if necessary also the inside, of the wall with portland cement or concrete to keep termites from boring through.

### Metal Termite Shields

The termite shields of metal described in paragraph 4 of building instructions, page 5, can easily be inserted over or in the masonry foundation of buildings or around pillars, supports, piping, etc., below the frame superstructure.

### Soil Poisons

The possibility of stopping, for a temporary period at least, termite work in buildings by means of soil poisons placed about the foundations is indicated by experiments which have been under way for several years by various agencies interested in termite con-



trol. The use of such soil poisons, is, however, still very much in the experimental stage and on present information cannot be recommended as a permanent remedy. On the other hand, where termite reconstruction herein recommended is deemed by the owner to be impracticable or too expensive, the following type of soil poisoning may be used and should give temporary relief:

The most promising of the soil poisons for such use is a full strength of crude liquid orthodichlorobenzene. This chemical should be applied after a trench has been dug 30 inches deep (in no case lower than the top of the footing) and at least 12 inches wide at the top around the foundation walls and piers supporting the main structure or porches, etc. The soil at the bottom of the trench should be saturated with full-strength orthodichlorobenzene at the rate of 1 gallon per 10 linear feet. The soil should then be replaced to within 3 inches of the surface and the treatment repeated. Before making such application, all wood debris should be removed from near the wall of the building and any earthlike shelter tubes over the foundation walls, etc., should be broken off. This liquid can be obtained at a reasonable price from wholesale chemists or manufacturers of insecticides.

The cautions to be observed in the use of this chemical are not to let it come in contact with the face and hands, as it burns slightly, and it is distinctly painful if it gets into the eyes. In applying it to a closed space beneath the building, the operator should not remain too long subject to the fumes, and it is desirable to secure as good ventilation as possible while applying the chemical.

Where there is danger of orthodichlorobenzene reaching the roots of ornamental plants, etc., paradichlorobenzene in the crystalline form may be used in the manner specified above. This chemical may also injure vegetation but will not spread as deeply as the liquid orthodichlorobenzene. In the Northern States it is well to use this crystal only during warm weather, when soil temperatures are likely to be high. Crystals should be used at the rate of approximately 5 pounds per 10 linear feet. Coal-tar creosote used alone or diluted with three parts of petroleum oil is also effective as a soil poison if applied at the same rate as orthodichlorobenzene. Like the latter chemical, it is injurious to plant life.

The use of these and other soil poisons is especially applicable to buildings raised on masonry pillars or partially filled-in basements or porches, but, as already indicated, such treatments lack adequate proof of effectiveness and permanency.

### Caution Against Exaggerated Fears

Without minimizing the damage which may be occasioned to buildings and their contents by termite attack, especially if long continued, it should, nevertheless, be pointed out that, particularly in the more temperate zones, serious termite injury to buildings is relatively infrequent and termite work may go on for years without involving necessity for extensive repairs or reconstruction of foundation timbers and flooring. Many instances could be cited of old houses dating back to colonial times where termite presence has been known for 50 years and probably for two or three times that period without radical injury resulting. Such immunity is due, in part, to the more massive timbers employed in these older types of houses, the

foundation beams of which were often of large size and hewn from the mature centers of hardwood trees.

Once having invaded a building, however, termites will continue their work and extend the damage slowly or rapidly unless and until their means of entrance from the outside has been broken by effective reconstruction. With the breaking of the connection between the building and the external soil moisture, all the termites in the building promptly die and injury ceases.

While, therefore, risk of sudden collapse strictly from termite injury of any fairly well constructed building can be dismissed as very rare in the United States, the discovery of termites in a building either as indicated by swarming or by yielding flooring and timbers certainly indicates the desirability of having an examination to determine what means should be taken to stop damage. If on such examination fairly widespread injury is found, much the cheapest course in the long run is to undertake one or the other of the two types of radical replacement given the highest rating in this leaflet. The natural tendency of the home owner is, however, to attempt control by local applications or other simpler measures.

Due to the extent of the possible ramifications of termites in a building which has been infested for some little time and the protection which they have in their burrows concealed in the wood, no control worth while by fumigation or spraying has proved to be possible, and spraying, even if applied under strong pressure at borings made at occasional points in eaten timbers, is often unnecessary and may be unsatisfactory. It is of interest, therefore, and informing to point out that in the case of many prominent buildings in Washington after years of effort with the various possibilities of local application of correctives, repellents, etc., together with piecemeal replacement of eaten timbers the more radical type of correction indicated has been adopted with resulting prompt and complete elimination of termites.

### Not All Termites Are Wood Destroyers

In connection with the foregoing discussion, it is well to point out that in certain areas, particularly in the Southwestern States, there occur types of termites which never feed upon, nor can they digest, sound wood and hence never attack such wood in buildings or elsewhere. These types feed on low vegetation—grasses, etc.—the stems of which they cover with earthlike tubes, and the resulting partially decayed vegetable material is the only food on which they can subsist. The presence of the earthlike tubes of these termites near or even under houses, or the presence of the winged forms may be wrongly interpreted as indicating liability of invasion by one of the wood-eating termites, and therefore the house owner should make sure that any agency professing to give termite control is able to distinguish between this form and the destructive type of termites. Before authorizing control measures involving what may prove to be quite unnecessary outlays, the owner, if in doubt, should consult his State entomologist or send specimens for identification to the United States Bureau of Entomology, Washington, D. C.